

# ***Epimedium alpinum* subsp. *albanicum* new subspecies for the flora of Kosovo**

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## **Abstract**

This paperwork provides data on the endemic taxa *Epimedium alpinum* subsp. *albanicum* Kit Tan, Shuka & Hallaçi, which is observed and identified for the first time for the territory of Kosovo. This taxon was found in Qafë Morine (Pass of Morina) within the locality of Devë, and Qafë Prush Municipality of Gjakova, on the road toward the border with Albania. *Epimedium alpinum* subsp. *albanicum*, is found in serpentine substrates which has a limited extent of presence in the investigated areas. This research includes the presence, description and distribution of this new taxa for the flora of Kosovo.

## **Keywords**

endemic, *Epimedium alpinum* subsp. *albanicum*, flora, Kosovo, new taxon

## **Introduction**

Kosovo is characterized by a small territorial area compared to other Balkan countries and beyond. Within the Balkan peninsula, in spite of its small territorial area Kosovo is very rich in its floristic and vegetation aspect, due to its continental and modified sub-Mediterranean climate, topography, geology, as well as the geographical position of the mountain massifs of Kosovo, especially Mali Sharr and the Albanian Alps (Rexhepi 1982; Hashani et al. 2014).

Given the natural and floristic values of Kosovo country, we have made continuous expeditions to areas that are distinguished by richer floristic diversity, and in the

course of such expeditions, we have explored the hilly areas of Devë and Qafë Prush areas which is located in the Municipality of Gjakova and lies along the Morina pass in the border area with Albania.

During 2018 and 2022 we conducted several floristic field trips in this areas and identified the endemic taxon *Epimedium alpinum* subsp. *albanicum* Kit Tan, Shuka & Hallaçi. (Figs 1, 2) that occurs mainly on serpentine substrates. Serpentine substrates are of particular importance for the flora and diversity of species in Kosovo and beyond. They are located in the central and northern part of the serpentine massifs of the western Balkans. Biodiversity in this substrate is high with a large number of endemic species interesting for both local and regional levels (Stevanović et al. 2003; Shuka and Jahollari 2007; Słomka et al. 2015, 2017; Krause et al. 2022).

The floristic reaches of the serpentine substrates has attract the attention of many botanists due to its uniqueness and diversity as well as for the modification that plants undergo in order to adapt to the toxic effect of the heavy metals of this substrate (Shuka et al. 2010; Słomka et al. 2014, 2017, 2018). Most of plant species that are growing in serpentine substrate have adapted mechanisms which tolerate the high concentrations of Cr, Ni, Fe, Al, Co, Mg or Mn (Stevanović et al. 2003; Dudić et al. 2007; Shuka and Jahollari 2007; Shuka 2009).

Edaphic isolation resulted in the development of a richness of local endemic species on serpentine soils. Among these, distinguished several monotypic obligate serpentine genera such as: *Halacsya sendtneri* (Boiss.) Dörf., *Bornmuellera emarginata* (Boiss.) Rešetnik or *Paramoltkia doerfleri* (Wettst.) Greuter & Burdet (Stevanović et al. 2003) which are tertiary relicts. Some other species such as *Aristolochia merxmulleri* Greuter & E. Mayer, have survived several glacial and postglacial cycles in this area (Krause et al. 2022). In its distribution range, southwest Kosovo and the serpentine massifs of Albania *E. alpinum* subsp. *albanicum* is companied with other interesting serpentine obligate species such as *Aster albanicus* (Degen) Degen, *Centaurea melanocephala* Pančić, *C. kosaninii* Hayek, *C. vlahorum* Hartvig, *Dioscorea balcanica* Košanin, *Euphorbia spinosa* L. subsp. *glabriflora* (Vis.) Frajman, *Forsythia europaea* Degen & Bald., *Genista hassertiana* (Bald.) Buchegger, *Minuartia baldaccii* (Halácsy) Mattf., *Paramoltkia doerfleri* (Wettst.) Greuter & Burdet, *Sanguisorba albanica* András. & Jáv., *Sedum album* L. subsp. *serpentine* (Janch.) Barina, *Klasea radiata* (Waldst. & Kit.) Á. Löve & D. Löve subsp. *cetinjensis* (Rohlena) Greuter & Wagenitz, *Stipa mayeri* Martinovsky, *Tulipa albanica* Kit Tan & Shuka, *T. kosovarica* Kit Tan, Shuka & Krasniqi and *Veronica barrelieri* H. Schott ex Roem. & Schult. subsp. *andrasovszkyi* (Jáv.) Albach (Rakaj 2009; Shuka and Tan 2009; Shuka et al. 2012; Millaku et al. 2013, 2018; Shuka et al. 2020).

*Epimedium* is a genus of perennial herbs in the family Berberidaceae, the majority have four-parted “spider-like” flowers in spring, which are eminent in Chinese ethno pharmacology due to varied pharmaceutical properties, is a unique and rare perennial medicinal herb that has not been researched and exploited much in terms of phytochemistry and molecular aspects. One of the species used as a dietary supplement is *E. grandiflorum* C. Morren. The majority of the species are endemic to China, with smaller numbers elsewhere in Asia, and a few in the Mediterranean region-internet (Sajad 2018).

## Material and methods

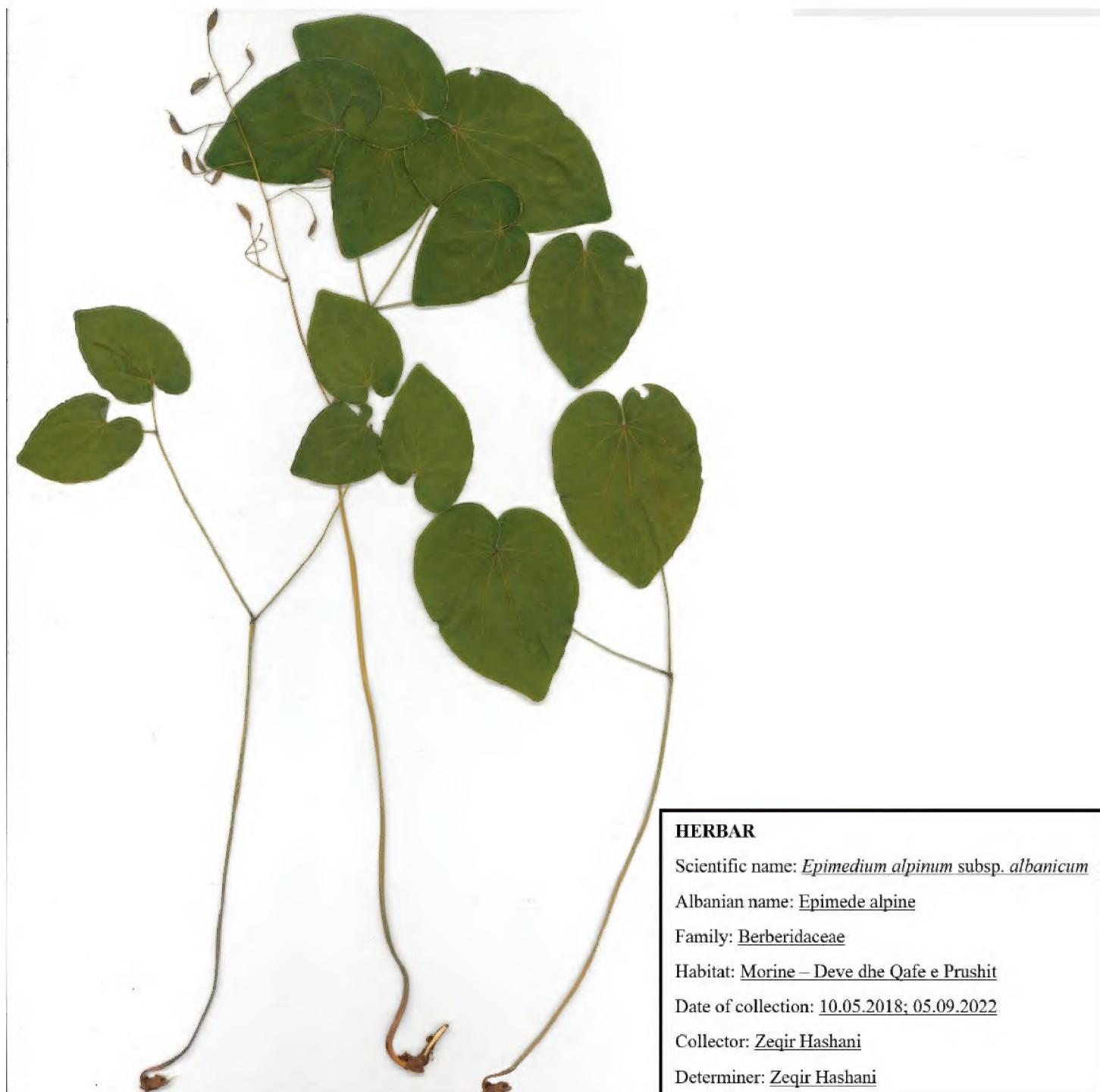
Collection and herbarisation of plant material in the new location of *Epimedium alpinum* subsp. *albanicum* was performed with the classical technique, as well as for other plant species taken in the study. Herbarised plant materials were collected during the years 2018 and 2022, in several floristic expeditions, carried out in the hilly areas of Morina and the surrounding areas, namely in the locality Devë, and locality Qafë Prush, Municipality of Gjakova (Fig. 3) 650 m, with coordinates 42°20'7.296"N, 20°22'12.5148"E, and 750 m with coordinates 42°19'0.7104"N, 20°21'44.6976"E. During the field expeditions, relevant records were kept on the type of vegetation and habitat, the composition of the substrate and the direction where the species is located. Digital photographs have also been taken of the species found along the transects. As basic literature for the determination of plant species, we used the Flora Europaea (Tutin et al. 1964, 1980), the Red Book of Vascular Flora of Kosovo (Millaku et al. 2013), as well as other articles published on the endemic flora of the Balkans and Albanian flora (Barina 2017; Shuka et al. 2020). The herbarised plants of *E. alpinum* subsp. *albanicum* have been stored in the National Herbarium of Tirana (TIR-0021475).

## Results and discussion

*Epimedium alpinum* subsp. *albanicum* is a perennial plant that usually grows from an underground rhizome in shady places, and completely dominates the ground floor, accompanied by woody species such as *Quercus frainetto* Ten. and *Quercus cerris* L., while in terms of substrate this species grows in serpentine substrates of the areas

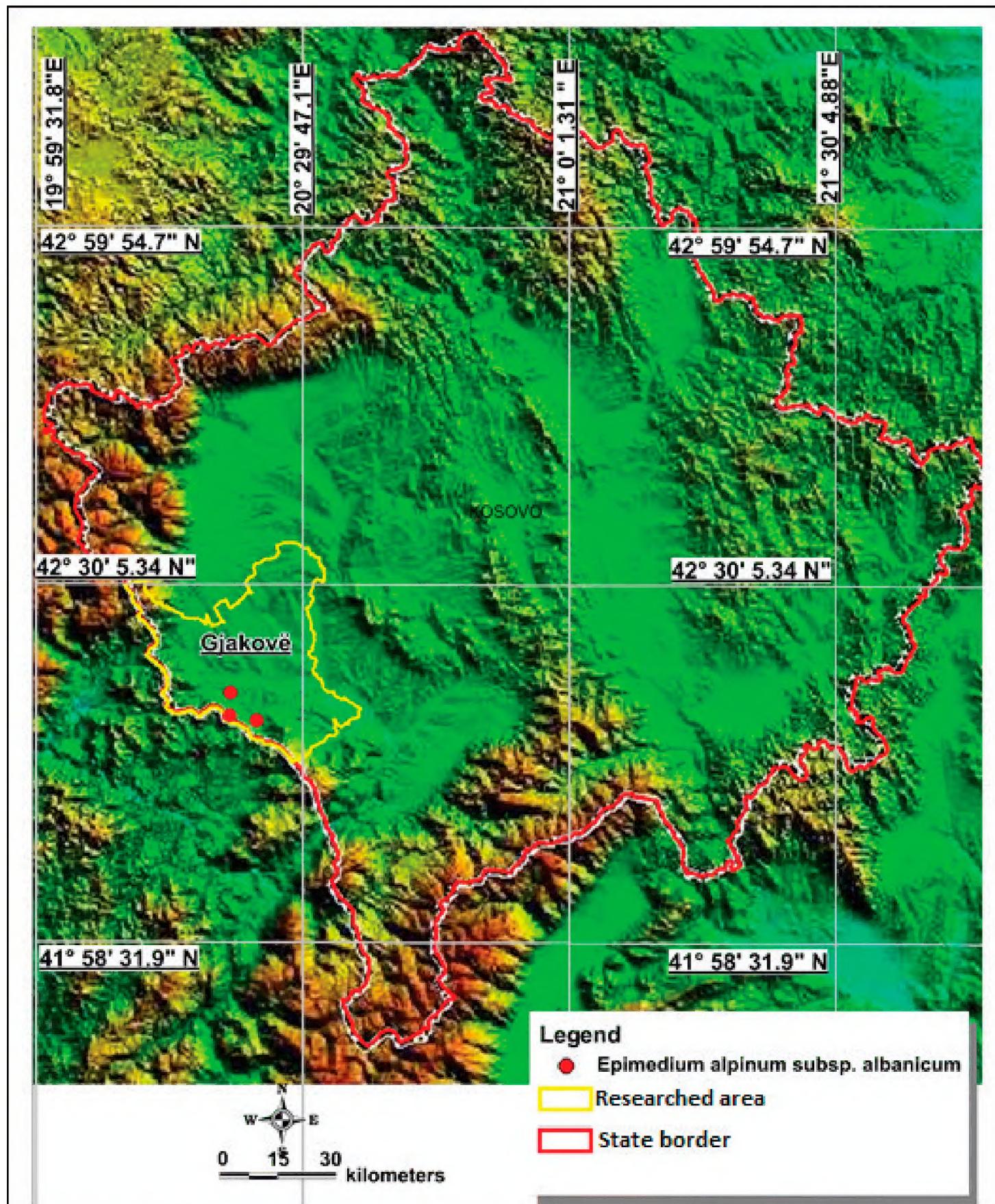


**Figure 1.** *Epimedium alpinum* subsp. *albanicum* with leaves, flowers and fruits (photos by Z. Hashani).



**Figure 2.** Herbarium of specimens of *Epimedium alpinum* subsp. *albanicum* (photo by Z. Hashani).

which we have explored. In Kosovo it grows mostly in subalpine zones, at altitudes from 480 m up to 750 m, in wet meadows where it was found with *Lilium albanicum* Griseb., *Centaurea kosaninii* Hayek, *Genista hassertiana* (Bald.) Buchegger, *Sanguisorba minor* Scop., *Ranunculus millefoliatus* Vahl, *Ornithogalum umbellatum* L., *Doronicum columnae* Ten., *Primula veris* L., *Genista tinctoria* L. and others. *Epimedium alpinum* subsp. *albanicum* flowers early in spring, from May to beginning of June and fruits during the June and July, depends from the exposition and altitudes. In the study areas *E. alpinum* subsp. *albanicum* firstly were recorded on May 10, 2018 near Devë village, on the right side of the road toward the border with Albania (Fig. 3). The species grows in the hilly area of this location at an altitude of 650 m, which in this period of our observation, has been in the vegetative period, just before the flowering phase (Figs 1, 2).



**Figure 3.** Distribution of *Epimedium alpinum* subsp. *albanicum* in Kosovo.

After searching in local and regional literature, we concluded that *E. alpinum* subsp. *albanicum* is a new finding for the country of Kosovo, than we have continued ducted other expeditions during the years 2018/2020. Therefore on May 19, 2020 we have observed *E. alpinum* subsp. *albanicum*, in the same locality, in Devë along the hill of Morina pass with the surroundings, in the serpentine substrate at an altitude of 750 m which was in the full stage of flowering (Figs 1, 2).

The third field trip was carried out during the beginning of August and September, 2022 and this taxon was recorded in between the borders of Qafë e Prushit (Fig. 3). In this locality, the taxon forms carpets on the ground below the woody species of *Quercus pubescens* Willd. and *Fraxinus ornus* L. Other species found with *E. alpinum* subsp. *albanicum* in this locality are *Eryngium palmatum* Pancic & Vis., *Linum elegans* Spruner ex Boiss., *Polygala doerfleri* Hayek, *Sanguisorba albanica* Andras. & Javorka, *Aster albanicus* (Degen) Degen, *Galatella linosyris* (L.) Rchb.f., *Tulipa sylvestris* L., *Genista hassertiana* (Bald.) Buchegger, *Allium albanicum* Brullo, C. Brullo, Cambria, Giusso & Salmeri, *Centaurea kosaninii* Hayek, *Satureja montana* L., *Bolanthus spergulifolius* (Jaub. & Spach) Hub.-Mor., *Potentilla rupestris* Falk var. *mollis* L., *Rosa arvensis* Huds., *Rosa gallica* L., *Betonica scardica* Griseb., *Betonica officinalis* L., *Allium moschatum* L., *Potentilla recta* L., *Campanula glomerata* L., *Achillea millefolium* L., *Plantago argentea* Chaix, *Prospero autumnale* (L.) Speta, *Erythronium dens-canis* L., *Saponaria sicula* Raf. subsp. *intermedia* (Simmler) Chater and *Siler zerny* (Hayek) Thell.

**Specimens examined.** ALBANIA. Kukësi municipality, NE Albania: Kukësi district, Livadhet e Laskit, ca. 1.3 km above Kalimashi tunnel, serpentine substrate, 1300 m, 14 May 2010, Hallaçi & Shuka s.n. (Holotype).

## Conclusions

According to the literature and the current database of the flora of Kosovo, *Epimedium alpinum* subsp. *albanicum* can be considered as new taxon for the flora of Kosovo. This taxon is known only in steppe and rocky serpentine substrates. Considering the small extent of occurrence as well as the great negative impact from surface mining activities, mainly chromium excavation and overgrazing, *E. alpinum* subsp. *albanicum* should be assessed as threatened species of Kosovo.

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